

steamer of the season passed up the Saint Croix River at Hudson, Wis. Ice in the Red River of the North began to move at Grand Forks, N. Dak., on the 19th, and navigation opened at that point on the 26th. Ice ran out of the Minnesota River at Granite Falls, Minn., on the 6th.

Mississippi River.—At Minneapolis, Minn., ice was passing out of the river on the 2d; 3d, river rising and nearly clear of ice; 5th, a boom 5 miles above the city gave way, and large quantities of ice and logs passed Minneapolis. At Saint Paul, Minn., ice passed out on the 2d, and on the 30th the first boat of the season from Saint Louis, Mo., arrived. At Red Wing, Minn., ice was moving on the 2d; 3d, ice on Lake Pepin reported unsafe for teams; 6th, river clear of ice, and ferryboats resumed trips; 26th, the first raft boat of the

season passed down the river; 28th, the first up river boat of the season passed Red Wing. The river was clear of ice at Saint Cloud, Minn., on the 16th. At La Crosse, Wis., ice began to move on the 2d; 4th, river nearly clear of ice and rising rapidly; the first boat of the season passed through the bridge; 7th, the first boat of the season for up river ports arrived.

Missouri River.—On the 1st the river was high and rising and the ice very rotten at Fort Buford, N. Dak.; 2d, ice gorge opposite the Post broke, and ice ran out rapidly. Ice broke and navigation opened at Bismarck, N. Dak., on the 3d. Ice broke at Pierre, S. Dak., on the 1st; 2d to 10th, running ice; 17th, a steamer passed up the river; 28th, the first steamer of the season from Bismarck, arrived.

ATMOSPHERIC ELECTRICITY.

THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

Thunderstorms were reported as follows: East of the Rocky Mountains they were reported in the greatest number of states, 21, on the 3d, 6th, and 8th; in 15 to 20 on the 4th, 5th, 7th, 9th to 14th, 18th, 19th, 20th, 25th, 26th, 28th, 29th, and 30th; in 10 to 14 on the 2d, 15th, 17th, 24th, and 27th; and in 5 to 9 on the 1st, 15th, 21st, 22d, and 23d. There were no dates on which thunderstorms were not reported.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 26, in Illinois; on 20 to 25 in Indiana, Kansas, Missouri, North Carolina, Ohio, and Texas; on 15 to 19 in Alabama, Arkansas, Florida, Iowa, Kentucky, Michigan, Mississippi, Pennsylvania, Tennessee, and West Virginia; on 10 to 14 in Louisiana, Maryland, Nebraska, New Jersey, New York, Virginia, and Wisconsin; on 5 to 9 in Connecticut, Massachusetts, Minnesota, Oklahoma, South Carolina, South Dakota, and Vermont; and on one to 4 in Delaware, District of Columbia, Indian Territory, Maine, New Hampshire, North Dakota, and Rhode Island.

West of the Rocky Mountains thunderstorms were reported in California on the 6th, 9th, 22d, and 27th; in Colorado on the 11th, 18th, 22d, 25th, 28th, and 29th; in Idaho on the 22d; in Nevada on the 22d, 23d, and 30th; in New Mexico on the 30th; in Utah on the 22d to 26th, 29th, and 30th; in

Washington on the 3d, 5th, 16th, 22d, and 26th; in Wyoming on the 6th and 7th. In states and territories other than those named no thunderstorms were reported.

AURORAS.

Auroras were reported as follows: 3d, Turin, N. Y. 4th, South Canistota, N. Y. 5th, Camp Dennison, Ohio. 6th, Eastport and Lewiston, Me. 7th, Ada, Minn.; Ericson, Nebr. 8th, Blue Hill, Mass. 9th, Valley Junction, Wis. 11th, Storrs, Conn.; Bar Harbor, Cornish, Eastport, Gardiner, Houlton, Lewiston, and Presque Isle, Me.; North Billerica and Royalston, Mass.; Ada, Minn.; Hanover, Lancaster, Newton, and Plymouth, N. H.; Chelsea, Northfield, and Norwich, Vt.; Sparta, Wis. 12th, Eastport and Houlton, Me.; Bar Harbor and Concord, Mass.; Littleton, N. H. 13th, Caldwell, Mich.; New Brunswick, N. J.; Baldwinsville, N. Y.; Manitowoc, Wis. 14th, Greenhorn, Colo.; Sault Ste. Marie, Mich.; Clear Lake and Fergus Falls, Minn.; Mayville, N. Dak. 15th, Greenhorn, Colo.; Concord, Mass. 16th, Collegeville, Minn.; Medford, Wis. 17th, Collegeville, Minn. 18th, Cornish, Me.; Turin, N. Y.; Chelsea, Vt. 19th, Cornish, East Machias, and Easton, Me.; Hanover and Plymouth, N. H.; Turin, N. Y.; Chelsea, Vt. 20th, Seymour, Ind.; Mayfield, Me. 22d, Greenhorn, Colo.; Lowell, Ohio. 23d, Mayville, N. Dak. 24th, Toms River, N. J. 25th, Pioche, Nev.; Keokuk Falls, Okla. 26th, Eastport, Houlton, Gardiner, and Lewiston, Me.; Turlington, Nebr.; Chelsea, Vt. 28th, Worthington, Ind.; Boon, Mich.; Willmar, Minn.

STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for April, 1893, of the directors of the various state weather services:

ALABAMA.

Temperature.—The mean was 3.8 above the normal; maximum, 90, at Newburg, 5th; minimum, 32, at Newburg, 22d and 24th; greatest monthly range, 58, at Newburg; least monthly range, 32, at Daphne.

Precipitation.—The average was 1.07 below the normal; greatest monthly, 9.95, at Florence; least monthly, 0.88, at Greensboro.

Wind.—Prevailing direction, south.—P. H. Mell, Observer, Weather Bureau, Auburn, director.

ARIZONA.

Temperature.—The mean was 1.5 above the normal; maximum, 102, at Palomas, 21st; minimum, 15, at Whipple Barracks, 30th; greatest monthly range, 67, at Palomas; least monthly range, 41, at Fort Bowie.

Precipitation.—The average was 0.50 below the normal; greatest monthly, trace, at Tucson; least monthly, 0.00, at all other stations.

Wind.—Prevailing direction, southwest.—W. Burrows, Observer, Weather Bureau, Tucson, director.

ARKANSAS.

Temperature.—The mean was 1.7 above the normal; maximum, 94, at Hot Springs, 4th, and at Fort Smith, 5th; minimum, 29, at Keesees Ferry, 15th; greatest monthly range, 64, at Hot Springs; least monthly range, 43, at Greenville, Miss.

Precipitation.—The average was 2.65 above the normal; greatest monthly, 13.22, at Rogers; least monthly, 8.64, at Fulton.

Wind.—Prevailing direction, south.—F. H. Clarke, Local Forecast Official, Weather Bureau, Little Rock, director.

CALIFORNIA.

Temperature.—The mean was 2.4 below the normal; maximum, 105, at Volcano Springs, 21st; minimum, 10, at Cisco, 7th; greatest monthly range, 64, at Tulare and Pasadena; least monthly range, 19, at Point Lobos.

Precipitation.—The average was 0.80 below the normal; greatest monthly, 12.12, at Crescent City; least monthly, 0.00, at a number of stations in the southern part of the state.